



MATERIALS RESEARCHER SELECTED AS 'FELLOW'



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Payoff

The election of Dr. Steven R. LeClair as a “Fellow” in the 60,000 member Society of Manufacturing Engineers (SME) recognizes his outstanding manufacturing research contributions that have strengthened national defense and enabled greater U.S. global competitiveness. His efforts have supported and strengthened Air Force operational requirements and helped make the nation’s commercial industries more internationally competitive. His election also enhances the Directorate’s reputation as a world leader in materials and manufacturing research and development.

Accomplishment

Dr. LeClair, a leading materials research engineer and scientist at the Air Force Research Laboratory’s Materials and Manufacturing Directorate’s (ML), has become one of only 225 individuals worldwide to be appointed as an SME “Fellow.” His work has had a profound impact on improving the quality of both polymer and ceramic composites for air and spacecraft structures. It is also improving the automation and control of the deposition processes that extend the life of spacecraft enabling cryogenic superconducting turbo-electric power for advanced defense systems and advanced semiconductors for future detector technologies.

Background

SME, headquartered in Dearborn, MI, is an international society dedicated to serving its members and the manufacturing community-at-large through the advancement of professionalism, knowledge and learning. Each year, the SME recognizes engineers and scientists for outstanding accomplishments in the field of manufacturing. This year, one of ML’s leading researchers, Dr. Steven R. LeClair, was one of only five individuals in the world selected for this honor, and was appointed to the grade of “Fellow.” Dr. LeClair has served as chief of the Directorate’s Manufacturing Technology Division’s Materials Process Design Branch since 1990. His responsibilities include leading an Air Force Office of Scientific Research (AFOSR) basic research task in developing advanced computational methods, leading a major in-house research program in materials processing, and planning long-term processing research. For two decades, Dr. LeClair’s leadership has helped provide the cutting edge for Air Force defense applications and national competitiveness in global markets. His efforts have led to major discoveries and fundamental breakthroughs in material process design and control methodology. He earned national recognition as a member of the National Research Council’s Materials Advisory Board and international recognition as an elected member of the International Federation of Information Processing committee on computer-aided manufacturing. Dr. LeClair is the genius behind a nationally-referenced field referred to as “Self-Directed Control,” which has served to define intelligent processing of materials (IPM) both in the United States and internationally. The genesis for Self-Directed Control was a collaborative effort to advance the curing process of polymer composites, which led to a patented method to enable the changing behavior of the polymer material to guide or “self-direct” the generation of a control path *in situ* (in real time during processing). The system was highly successful in reducing the cure times for graphite-epoxy materials by 75 percent (from 12 hours to less than three hours), while improving the quality in performance properties. While at ML, Dr. LeClair published 63 refereed papers in national and international journals and proceedings and has earned four patents.